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# FIVE NEW EPIGEAN SPECIES OF THE AUSTRALIAN PLANTHOPPER GENUS *SOLONAIMA* KIRKALDY (HOMOPTERA: FULGOROIDEA: CIXIIDAE)

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ABSTRACT

Five new epigean species of the cixiid genus *Solonaima* Kirkaldy, which is endemic in Australia, are described from Queensland: *S. bifurca* sp. nov., *S. riocampa* sp. nov., *S. cedrivula* sp. nov., *S. minuta* sp. nov., and *S. ornata* sp. nov.. A key to the epigean *Solonaima* species is given.

KEYWORDS: Homoptera, Fulgoroidea, Cixiidae, *Solonaima,* new species, Australia.

## INTRODUCTION

Prior to this study the endemic Australian cixiid genus *Solonaima* Kirkaldy was represented by only two species in the epigean fauna of Queensland, *S. solonaima* Kirkaldy (type species) and *S. pallescens* (Distant). As a result of recent investigations in limestone caves and lava tubes in North Queensland (Chillagoe, Mt. Mulgrave, Undara) Hoch and Howarth (in prep.) described six cavernicolous species which undoubtedly belong to *Solonaima.* These species display varying degrees of cave adaptation (three facultative, three obligate cave species). Moreover, Hoch and Howarth *(op. cit.)* redescribed *S. solonaima* and *S. pallescens,* re-defined the genus and gave reasons for its monophyly. Subsequent examination of cixiid material preserved at the Queensland Museum, Brisbane, and the Queensland Department of Primary Industries, Brisbane, revealed the existence of another five new *Solonaima* species. Unfortunately the collecting data do not hold any ecological information, but since none of these species displays any troglomorphic characters (e.g. eye-, wing-, pigment-reduction) I proceed on the assumption that they are epigean.

The following abbreviations are used for the names of institutions where the specimens are held: QM Queensland Museum, Brisbane; QDPI Queensland Department of Primary Industries, Brisbane.

## SYSTEMATICS

### Genus *Solonaima* Kirkaldy

*Solonaima* Kirkaldy, 1906: 396 (type species *Solonaima solonaima* Kirkaldy, by monotypy).

*Talaloa* Distant, 1907: 294, synonymized by Muir 1925: 104.

**Diagnosis.** (modified after Hoch and Howarth, in prep.).

Moderately large cixiids with wings shallowly teetiform. Vertex concave, with lateral margins strongly ridged, divided into anterior and posterior portions by a transverse carina; posterior portion nearly vertical, with lateral margins diverging posteriorly. Frons and clypeus narrow, centrally and laterally ridged; lateral margins convex and directed anterolaterad. Frons slightly broadened beneath eyes. Rostrum elongate, almost attaining anterior margin of genital segment. Median ocellus in epigean species distinctly present, in cavernicolous species reduced or absent. Antennal segments elongate, cylindrical, second segment two to three times as long as first. Pro- and mesonotum tricarinate. Tegmina translucent to hyaline; Sc + R branch distad of basal third, and Cu forking distad of Sc + R branch. Hind tibiae laterally unarmed, with six apical teeth. Hind legs with basal tarsal segment elongate, about 1.3 times as long as segments II and III together. Male genital segment higher than wide caudally; caudal

margin symmetrical with medioventral process simple, subtriangular. Parameres spoon-shaped, apically dilated; dorsal margin of dilated part produced in a more or less conspicuously pointed tip. Aedeagus with dorsal portion of basal part in all epigean species with bulbous or spinose processes which form a groove conducting the spine (which arises subapically on the right side) to left. Movable distal part of aedeagus well developed, bent dorsally to the left. Female genitalia with ovipositor complete; distal portion of pregenital sternite slightly bent dorsad; 9th tergite obliquely truncate, with wax-secreting area medially divided by a membranous area.

**Key to the epigean species of *Solonaima***

1. Clavus dark; median carina of frons obsolete ..... *ornata* sp. nov.
   Clavus translucent; median carina of frons sharply ridged ..... 2
2(1). Anterior portion of vertex rectangular ..... 3
   Anterior portion of vertex pentagonal ..... 4
3(2). Dark markings along distal crossveins of tegmen; first antennal segment dark brown; basal part of aedeagus laterally with two rigid spinose processes (one on each side) which are directed caudad ..... ..... *solonaima* Kirkaldy
   Distal crossveins of tegmen without dark markings; first antennal segment whitish; basal part of aedeagus with only one spinose process arising right laterally ..... *minuta* sp. nov.
4(2). Anterior portion of vertex wider at base than long in midline ..... 5
   Anterior portion of vertex as long as or longer in midline than wide at base ..... 6
5(4). Anterior portion of vertex twice as wide at base as long in midline; tegmen without markings; each laterodorsal angle of male genital segment produced into a pointed tip; basal part of aedeagus ventrally with a short, slender spine ..... ..... *riocampa* sp. nov.
   Anterior portion of vertex about 1.6 times as wide at base as long in midline; tegmen with brownish markings along crossveins; male genital segment with caudal margin smooth; basal part of aedeagus ventrally with a bifurcate spinose process ..... ..... *bifurca* sp. nov.
6(4). Basal part of aedeagus left laterally without any spinose processes near its base, right laterally with two slender spines: the superior one directed caudad, the inferior one directed basad ..... *cedrivula* sp. nov.
   Basal part of aedeagus left laterally with compact, basally flattened spine which is bent laterodorsad, and right laterally with a trifurcate spinose process which is directed straight caudad ..... *pallescens* (Distant)

### *Solonaima bifurca* sp. nov.
(Figs 1-5)

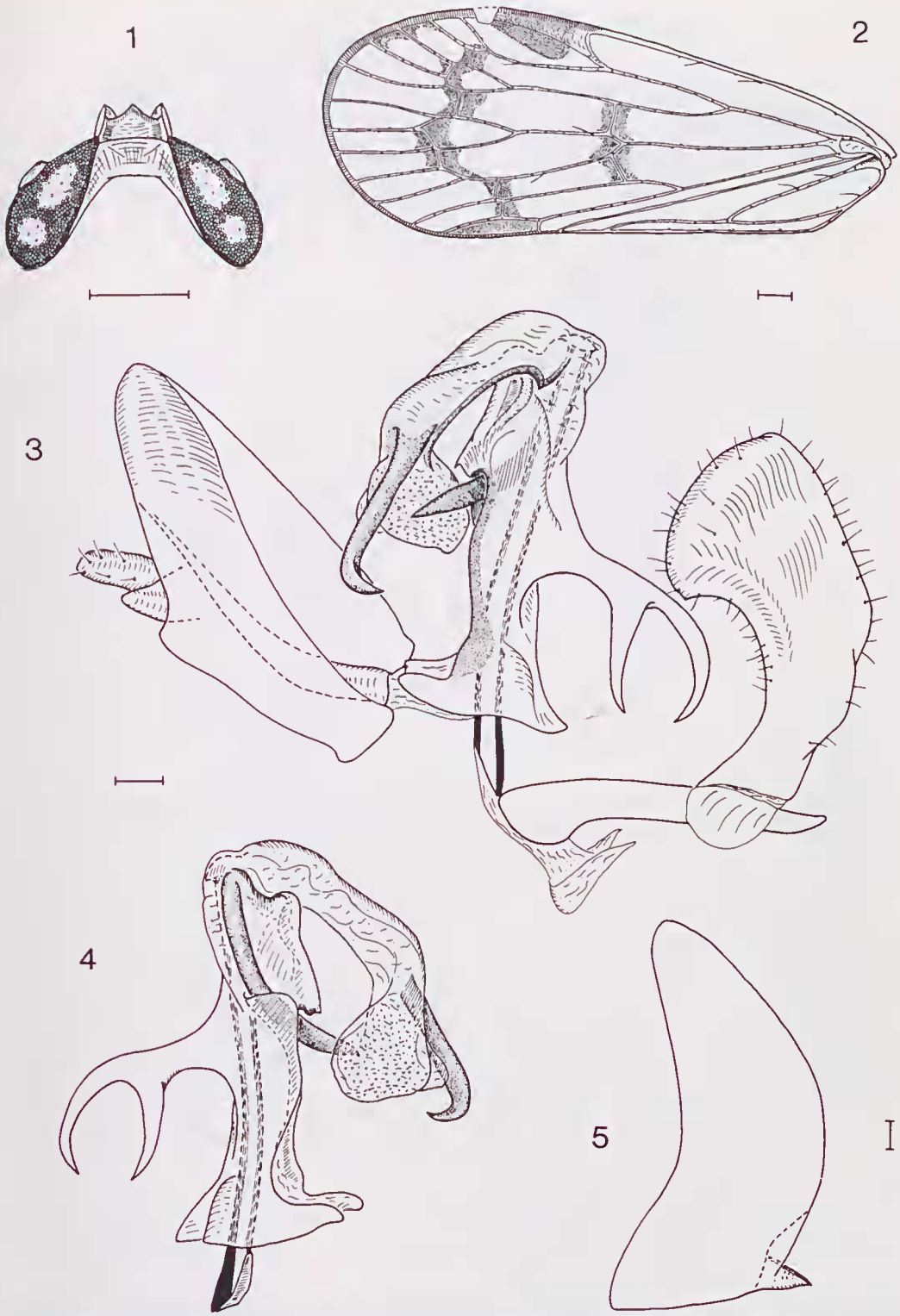
**Type material.** HOLOTYPE — ♂, National Park (= Lamington National Park), Queensland, xii.1921, H. Hacker, in QM. PARATYPES — ♂, 1 ♀, same data as holotype, in QM. 1 ♀, same locality as holotype, xii.1919, in QM.

**Description.** Generally dark brown; pronotum yellowish; first antennal segment dark brown. Tegmen translucent, with dark brown markings along distal and proximal crossveins and in inner apical cell; pterostigma distinct, brownish. Total length ♀ 8.8-9.0mm, ♂ 9.8 mm.

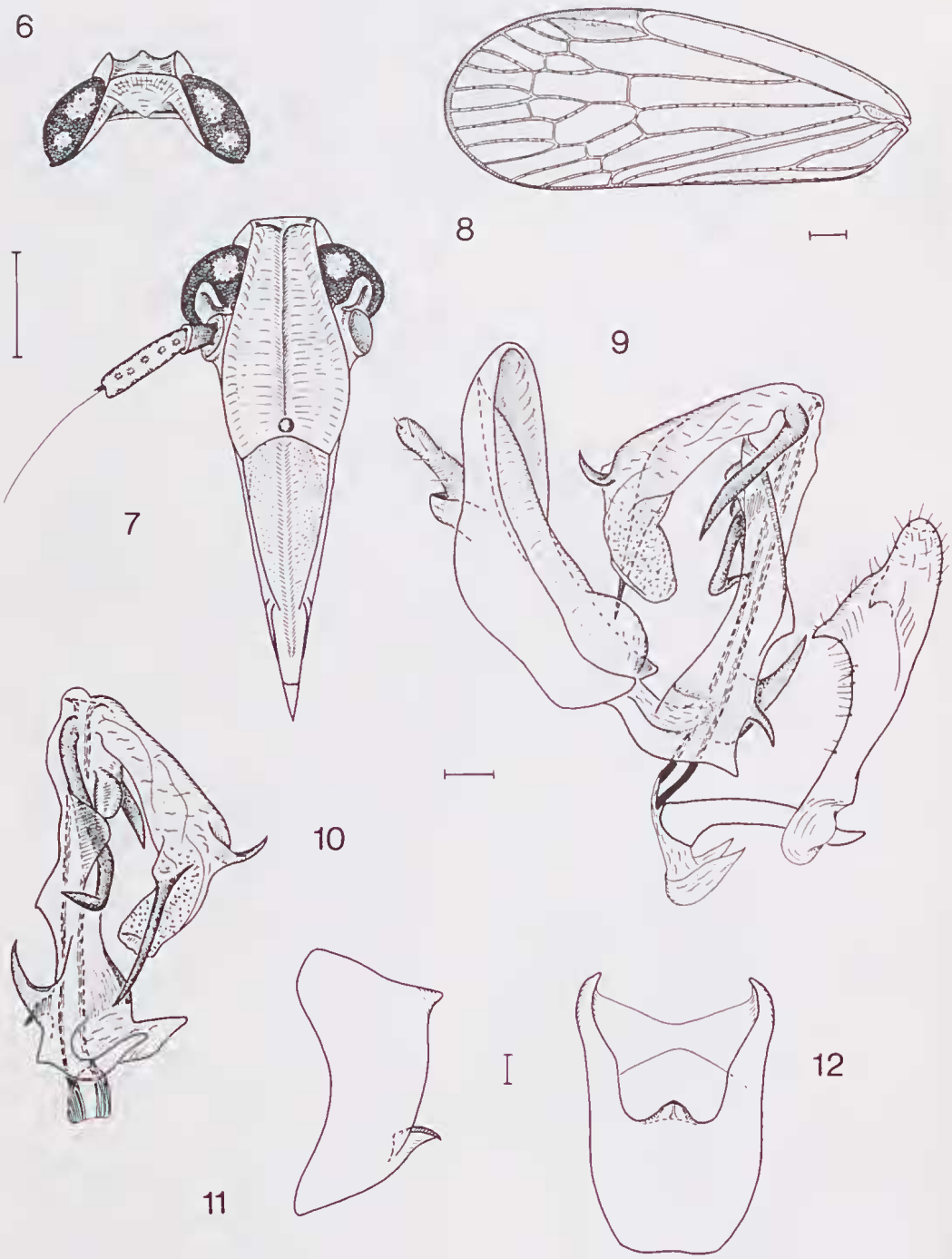
*Head:* Anterior portion of vertex broad pentagonal, 1.6 times as wide at base as long in midline. Frons twice as long as its greatest width, with median carina sharply ridged; area of frons concave. Post- and anteclypeus together as long as frons. Second antennal segment 2.25 times as long as first.

*Thorax:* Pronotum about as long as anterior portion of vertex, and 1.4 times as wide as greatest width of head. Mesonotum in midline about 9.4 times the length of pronotum. Basal tarsal segment of hind leg with 7, second tarsal segment with 6 to 7 apical teeth. Tegmen 2.5 times as long as wide. Longitudinal veins densely, but inconspicuously papillate.

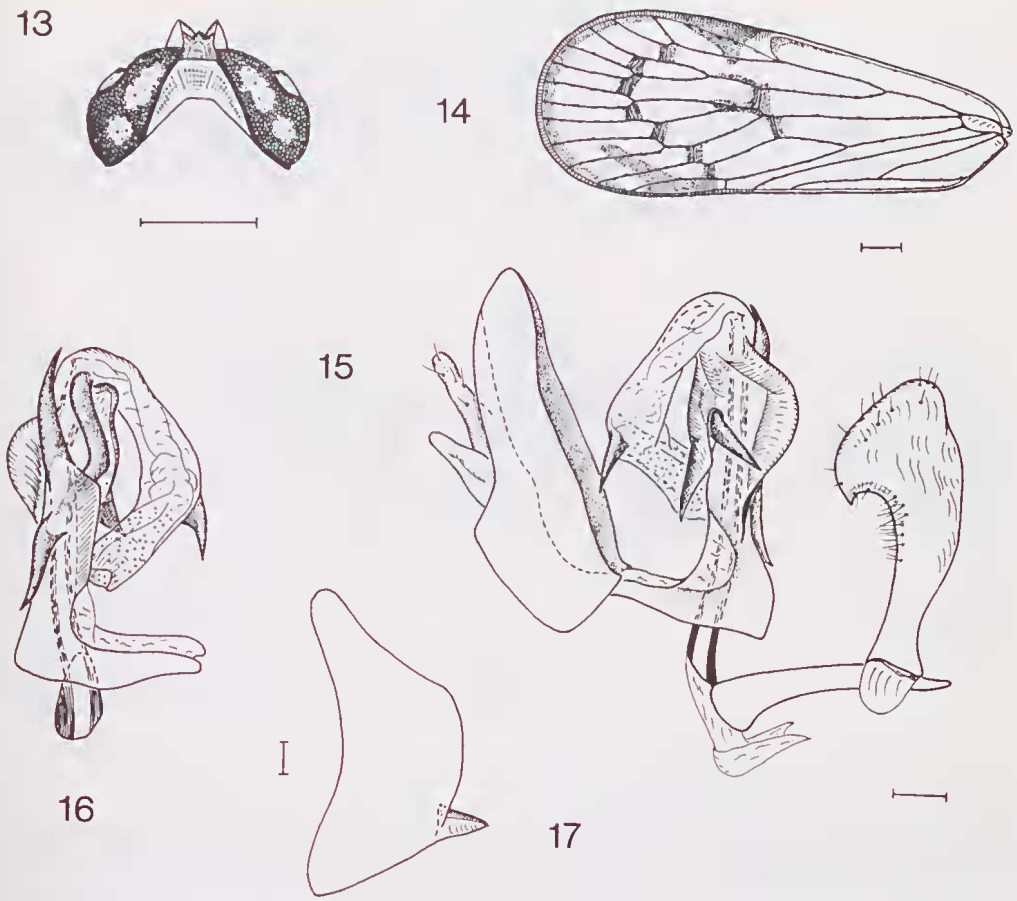
*Male genitalia* (Figs 3-5): Genital segment caudally 1.5 times as high as wide, in lateral aspect ventrally 4.7 times as long as dorsally; caudal margin smooth. Anal segment nearly ovate, slightly asymmetrical, hood-shaped.




**Figs 1-5.** *Solonaima bifurca* holotype: **1,** head, dorsal view; **2,** tegmen; **3,** anal segment, aedeagus, connective and left paramere, left lateral view; **4,** aedeagus, right lateral view; **5,** genital segment, left lateral view. Figs 3,4, to same scale. Figs 1,2, scale line 0.5mm; 3-5, scale line 0.1mm.




**Figs 6-12.** *Solonaima riocampa* holotype: **6,** head, dorsal view; **7,** head, ventral view; **8,** tegmen; **9,** anal segment, aedeagus, connective and left paramere, left lateral view; **10,** aedeagus, right lateral view; **11,** genital segment, right lateral view; **12,** same, ventral view. Figs 6,7, to same scale; 9, 10, to same scale. Figs 6-8, scale line 0.6mm; 9-12, scale line 0.1mm.




**Figs 13-17.** *Solonaima cedrivula* holotype: **13,** head, dorsal view; **14,** tegmen; **15,** anal segment, aedeagus, connective and left paramere, left lateral view; **16,** aedeagus, right lateral view; **17,** genital segment, left lateral view. Figs 15, 16, to same scale. Figs 13,14, scale line 0.5mm; 15-17, scale line 0.1mm.

Parameres with dorsal tip of dilated distal part blunt, otherwise as described for the genus. Basal part of aedeagus ventrally with a strong bifurcate spine directed basad; dorsal portion with 2 lamellar processes forming a groove for a long, terete spine which inserts subapically on the right side. Distal part of aedeagus apically granulate; with a strong spine inserting left laterally, directed basad and apically curved ventrad. Connective straight.

*Female genitalia:* Distal portion of pregenital sternite slightly bent dorsad, otherwise as described for the genus.

**Remarks.** *S. bifurca* can easily be distinguished from all other *Solonaima* species by its large body size and the bifurcate spinose process on the ventral side of the aedeagus' basal part.

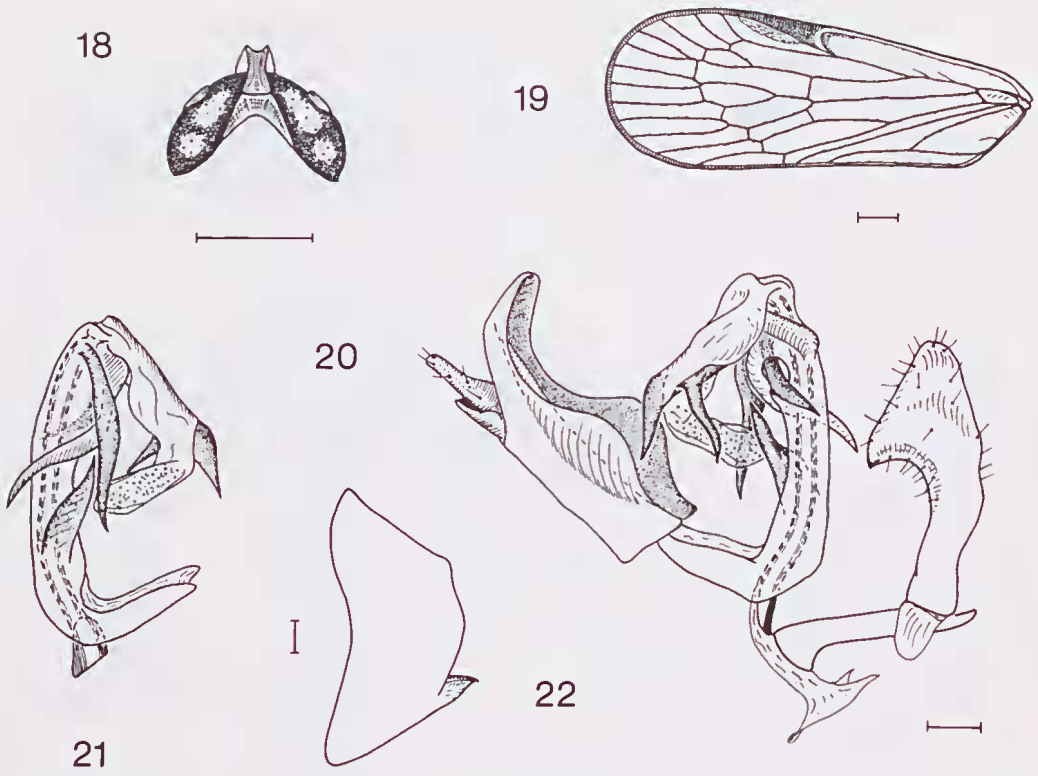
### *Solonaima riocampa* sp. nov.

(Figs 6-12)

**Type material.** HOLOTYPE — ♂, Brookfield, Queensland, 10.x.(19)26, H. Hacker, in QM.

**Description.** *Male* — Generally brownish; pronotum yellowish; antennal segments dark brown. Tegmen translucent, venation brownish, without markings; pterostigma distinct, brownish. Total length ♂ 7.1 mm.

*Head:* Anterior portion of vertex broad pentagonal, about twice as wide at base as long in midline. Frons 1.6 times as long as its greatest width, with median carina sharply ridged; area of frons shallowly concave, almost planate. Post- and anteclypeus together 1.3 times as long as frons. Second antennal segment nearly 3 times as long as first.



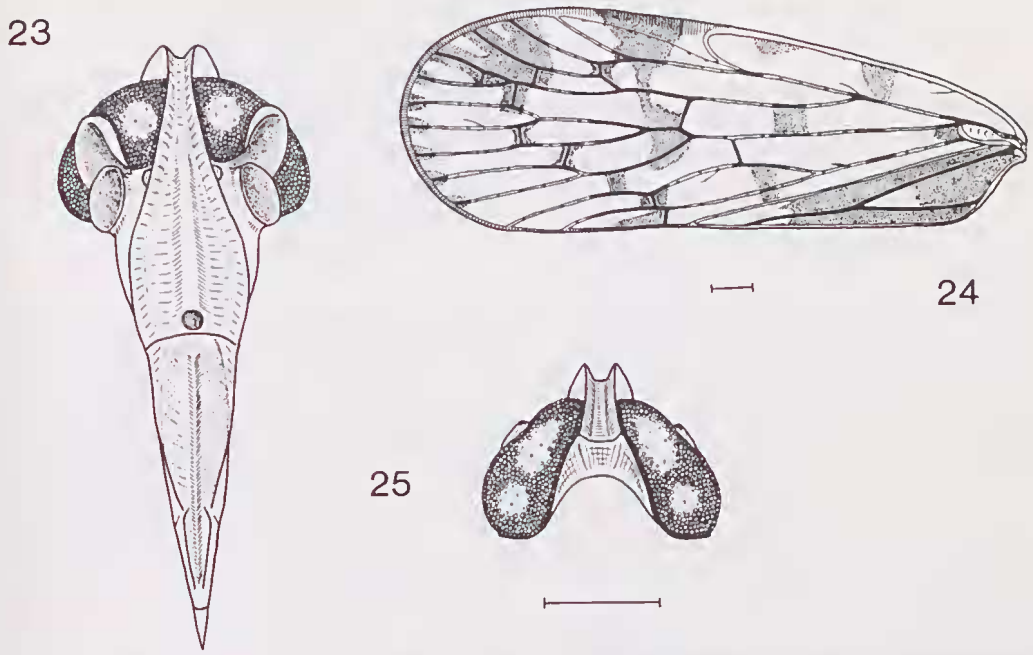

**Figs 18-22.** *Solonaima minuta* holotype: **18,** head, dorsal view; **19,** tegmen; **20,** anal segment, aedeagus, connective and left paramere, left lateral view; **21,** aedeagus, right lateral view; **22,** genital segment, left lateral view. Figs 20,21, to same scale. Figs 18,19, scale line 0.5mm; 20-22, scale line 0.1mm.

*Thorax:* Pronotum as long as anterior portion of vertex, 1.5 times as wide as greatest width of head. Mesonotum in midline about 7.5 times the length of pronotum. Basal tarsal joint of hind leg with 7, second tarsal joint with 8 apical teeth. Tegmen 2.7 times as long as wide. Longitudinal veins densely but inconspicuously papillate.

*Male genitalia* (Figs 9-12): Genital segment caudally 1.2 times as high as wide, in lateral aspect ventrally 5.8 times as long as dorsally, with each laterodorsal angle produced in a short, stout process which is directed mediad. Medioventral process of genital segment medially ridged. Anal segment broad at base, apically rounded and slightly bent ventrad. Dilated part of parameres with dorsal tip acute and directed cephalad, and medially at base with a short pointed process. Basal part of aedeagus on its right side with a strong spine directed caudad and ventrally with a short, slender spine bent basad. Dorsal portion of basal part with a bulbous distal and a lamellar proximal protuberance; these forming a groove through which a long, slender, movable spine (inserting subapically on the right side) is led to the aedeagus' left side and recurrently bent to the right side in its distal third. Basal part of aedeagus apically on the left side with a long, slender, movable spine which is curved laterad. Distal part of aedeagus on its right side with a long, slender spine which in repose is directed straight basad, and a short, slender spine on its left side which is curved laterocaudad. Distal part of aedeagus apically granulate. Connective slightly bent caudad.

*Female* — Female unknown.

**Remarks.** This species may be distinguished from other epigean *Solonaima* species by the broad anterior portion of the vertex (twice as wide at base as long in midline), the shape of the male genital segment (laterodorsal angles) produced in short pointed processes) and the armament of the aedeagus.




**Figs 23-25.** *Solonaima ornata* holotype: **23,** head, ventral view; **24,** tegmen; **25,** head, dorsal view. Figs 23,25, to same scale. Scale lines 0.5mm.

### *Solonaima cedrivula* sp. nov.
(Figs 13-17)

**Type material.** HOLOTYPE — ♂, Little Cedar Creek, Mt. Spec, 1086 ft (*ca* 330 m), to light, N.E. Queensland, 1.ii.1965, E.C. Dahms, in QM.

**Description.** *Male* — Generally brownish; pronotum yellowish; first antennal segment dark brown. Tegmen translucent, with venation brownish and brown markings along distal and proximal crossveins and across the 3 inner apical cells; pterostigma distinct, brownish. Total length ♂ 6.7 mm.

*Head:* Anterior portion of vertex pentagonal, narrow, about as long as its basal width. Frons like in *S. bifurca* sp. nov. about twice as long as its greatest width, with median carina sharply ridged; area of frons concave. Post- and anteclypeus together 1.1 times as long as frons. Second antennal segment 2.4 times as long as first.

*Thorax:* Pronotum about as long as anterior portion of vertex, and 1.3 times as wide as greatest width of head. Mesonotum in midline 8.4 times the length of pronotum. Basal and second tarsal segments of hind leg apically with 7 teeth. Tegmen 2.7 times as long as wide. Longitudinal veins densely but inconspicuously papillate.

*Male genitalia* (Figs 15-17): Genital segment caudally 1.5 times as high as wide, in lateral aspect ventrally 7.5 times as long as dorsally; caudal margin smooth. Anal segment broad at base, apically rounded, hood-shaped. Parameres with dorsal tip of dilated part produced into a stout, apically acute process. Basal part of aedeagus with 2 slender spines inserting medially on its right side: the inferior one directed basad, the superior one directed distad. Dorsal portion of basal part with a rigid, s-shaped, spinose process which is curved basad to the left, with its base forming a groove through which a long, slender, terete spine (inserting subapically on the right side of basal part of aedeagus) is led to the left. Basal part of aedeagus on its left side with an ear-like protrusion which is bent ventrad. Distal part of aedeagus apically granulate, left laterally with a slender spine which in repose is directed basad. Connective straight.

*Female* — Female unknown.

**Remarks.** *S. cedrivula* externally resembles *S. pallescens,* but can be distinguished from this and the other *Solonaima* species by the spine-configuration of the aedeagus.

### *Solonaima minuta* sp. nov.
(Figs 18-22)

**Type material.** HOLOTYPE — ♂, Iron Range, Cape York Peninsula, N. Queensland, 27.iv. - 4.v.1973, G.B. Monteith, In QM. PARATYPES — 2 ♀, same data as holotype. 1 ♂, Lockerbie Scrub, Cape York Peninsula, N. Queensland, 7 - 14.iv.1977, R.I. Storey, in QDPI.

**Description.** Generally brownish; vertex and pronotum yellowish; first antennal segment whitish, apically brownish, second antennal segment yellowish brown. Tegmen translucent, without any markings, venation brownish; pterostigma distinct, dark brown. Total length ♂ 5.6-5.9 mm, ♀ 6.0-6.3 mm.

*Head:* Anterior portion of vertex longitudinal rectangular, slightly broadened at base, anterior transverse carina vanishing. Anterior portion of vertex 1.5 times as long as its basal width. Frons 2.7 times as long as its greatest width, with median carina only slightly ridged; area of frons concave. Post- and anteclypeus together 1.2 times as long as frons. Second antennal segment about twice as long as first.

*Thorax:* Pronotum half as long as anterior portion of vertex, and 1.4 times as wide as greatest width of head. Mesonotum in midline 9.2 times the length of pronotum. Basal and second tarsal segments of hind leg apically with 7 spines. Tegmen 2.5 times as long as wide. Longitudinal veins densely but inconspicuously papillate.

*Male genitalia* (Figs 20-22): Genital segment caudally 1.25 times as high as wide, in lateral aspect ventrally 5.7 times as long as dorsally; caudal margin smooth. Anal segment broad at base, apically rounded and bent ventrad, laterally with two shallow lobes directed ventrad. Parameres like in *S. cedrivula*. Basal part of aedeagus with a rigid basal and two movable subapical spines on its right side: basal spine irregularly tapering, directed dorsocaudad; subapical spines long, slender, one directed basad, the other (which is nearly invisible in right lateral view) curved to the left side, passing through a groove formed by a rigid spine-like, s-shaped process of the dorsal portion of the aedeagus basis. Distal part of aedeagus apically granulate, with two spines on its left side. Connective straight.

*Female genitalia:* As in *S. bifurca*.

**Distribution.** Known only from Iron Range and Lockerbie Scrub in Cape York Peninsula (Queensland).

**Remarks.** This species can be distinguished from other *Solonaima* species by its whitish first antennal segment and the configuration of aedeagal spinulation.

### *Solonaima ornata* sp. nov.
(Figs 23-25)

**Type material.** HOLOTYPE — ♀, Mt. Tozer Area, Iron Range, N. Queensland, 29.iv. - 1.v.1973, G.B. Monteith, in QM.

**Description.** *Female* — Head and mesonotum brownish, antennal segments yellowish brown; pronotum, legs and abdomen yellowish. Tegmen translucent, with clavus dark and characteristic dark brown markings (Fig. 24); venation brownish, in areas of markings dark brown; pterostigma distinct, dark brown. Total length ♀ 8.9 mm.

*Head:* Vertex anteriorly rounding into frons, not separated from frons by a transverse carina. Frons 2.2 times as long as its greatest width, median carina obsolete; area of frons nearly planate. Post- and anteclypeus together about as long as frons.

*Thorax:* Pronotum 1.4 times as wide as greatest width of head. Mesonotum in midline about 7 times the length of pronotum. Basal and second tarsal segments of hind leg with 7 apical teeth. Tegmen 2.8 times as long as wide. Longitudinal veins densely papillate.

*Female genitalia:* As in *S. bifurca*.

*Male* — Male unknown.

**Remarks.** Although *S. ornata* is so far known only from a single female, this species differs significantly from all other known *Solonaima* species not only in its characteristic pattern of the tegmina, but also in the median carina of the frons which in all other epigean *Solonaima* species is sharply ridged while it is rather obsolete in *S. ornata*.

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## REFERENCES

Distant, W.L. 1907. Rhynehotal notes XLI. *Annals and Magazine of Natural History* (7)**19:** 277-295.

Hoeh, H. and Howarth, F.G. (in prep.). Six new eavernicolous eixiid planthoppers in the genus *Solonaima* from Australia (Homoptera: Fulgoroidea).

Kirkaldy, G.W. 1906. Leafhoppers and their natural enemies (pt. IX. Leafhoppers. Hemiptera). *Bulletin of the Hawaiian Sugar Planters Association, Division Entomology* **1**(9): 271-479, Pls 21-32.

Muir, F. 1925. On the genera of Cixiidae, Meenoplidae and Kinnaridae (Fulgoridae, Homoptera). *Pan-Pacific Entomologist* **1**(3): 97-110.

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